

CLAIMS

1. In a rotational electric machine comprising: a stator having an annular magnetic substance, main poles provided so as to extend radially outward from said magnetic substance, windings wound on said main poles respectively, and inductors each constituted by a plurality of magnetic teeth formed at a forward end of corresponding one of said main poles; and an outer rotor type permanent magnet rotor having north (N) and south (S) magnetic poles arranged alternately on an inner circumference of said rotor and in a rotating direction of said rotor, said stator and said rotor being in opposition to each other while an air gap is held therebetween;

a motor-driven system wherein an outer rotating body such as a tire, a drum, a table or the like is mounted on an outer circumferential portion or on a side portion of said rotor.

2. In a rotational electric machine comprising: a stator having an annular magnetic substance, main poles provided so as to extend radially outward from said magnetic substance, windings wound on said main poles respectively, and inductors each constituted by a plurality of magnetic teeth formed at a forward end of corresponding one of said main poles; and

an outer rotor type rotor constituted by a magnetic substance having magnetic teeth formed on an inner circumference thereof, said stator and said rotor being in opposition to each other while an air gap is held therebetween;

a motor-driven system wherein an outer rotating body such as a tire, a drum, a table or the like is mounted on an outer circumferential portion or on a side portion of said rotor.

3. In a rotational electric machine according to Claim 1 or 2, a motor-driven system wherein an outer rotating body such as a tire, a drum, a table or the like is mounted on said outer circumferential portion or on said side portion of said rotor through an output portion of a reduction gear, said output portion being concentric with a rotation shaft and output of said rotational electric machine.

4. In a rotational electric machine according to any one of Claims 1 to 3, a motor-driven system wherein said stator has a 3-phase winding structure.

5. In a rotational electric machine according to any one of Claims 1 to 3, or in a rotational electric machine which is obtained by changing an outer roller type rotational electric machine according to Claim 1 or 2 into an inner rotor

type, or in a rotational electric machine of said inner rotor type and of a 3-phase HB type in which the number of rotor teeth is P ,

a motor-driven system wherein as a voltage to be applied to said rotational electric machine, a voltage of a battery is used while said battery voltage is stepped up/down by chopping,

wherein $P=m(3n\pm 1)$ in which m is the number of main poles of the stator for each phase and an integer not smaller than 1, or $P=k(6n\pm 1)$ in which $2k$ is the number of main poles of the stator for each phase and each of k and n is an integer not smaller than 1.

6. In a rotational electric machine according to any one Of Claims 1 to 3, or in a rotational electric machine which is obtained by changing an outer rotor type rotational electric machine according to Claim 1 or 2 into an inner rotor type, or in a rotational electric machine of said inner rotor type and of a 3-phase HB type in which the number of rotor teeth is P ,

a motor-driven system wherein a phase of current relative to a motional electromotive force of said rotational electric machine is controlled,

wherein $P=m(3n\pm 1)$ in which m is the number of main poles of the stator for each phase and an integer not smaller than 1, or $P=k(6n\pm 1)$ in which $2k$ is the number of main poles of the stator for each phase and each of k and n is an integer not smaller than 1.

7. In a rotational electric machine according to any one of Claims 1 to 3, or in a rotational electric machine which is obtained by changing an outer rotor type rotational electric machine according to Claim 1 or 2 into an inner rotor type, or in a 3-phase rotational electric machine of an outer or inner rotor type having main poles the number of which is $3m$ or $6k$ with 3-phase windings, the rotor being of a HB type in which the number of rotor teeth is P or being of a cylindrical type in which the number of rotor poles is $2P$ and the cylindrical rotor is magnetized into north (N) and south (S) magnetic poles alternately,

a motor-driven system wherein positional information of said rotor is obtained to thereby obtain timing of excitation of windings,

wherein $P=m(3n\pm 1)$ in which m is the number of main poles of the stator for each phase and an integer not smaller than 1, or $P=k(6n\pm 1)$ in which $2k$ is the number of main poles of

the stator for each phase and each of k and n is an integer not smaller than 1.

8. In a rotational electric machine according to any one of Claims 1 to 3, or in a rotational electric machine which is obtained by changing an outer rotor type rotational electric machine according to Claim 1 or 2 into an inner rotor type, or in a 3-phase rotational electric machine of an outer or inner rotor type having main poles the number of which is $3m$ or $6k$ with 3-phase windings, the rotor being of a HB type in which the number of rotor teeth is P or being of a cylindrical type in which the number of rotor poles is $2P$ and the cylindrical rotor is magnetized into north (N) and south (S) magnetic poles alternately,

a motor-driven system wherein an axis of rotating magnetic field is excited by 3-phase AC current excitation, microstep excitation, or full step excitation, which is advanced by γ degrees with respect to a shaft of said rotor at a present position,

wherein $P=m(3n\pm 1)$ in which m is the number of main poles of the stator for each phase and an integer not smaller than 1, or $P=k(6n\pm 1)$ in which $2k$ is the number of main poles of the stator for each phase and each of k and n is an integer

not smaller than 1.

9. A motor-driven system according to Claim 8, wherein the value of γ is equal to 90° ($\gamma=90^\circ$) in terms of electrical angle.

10. A motor-driven system according to Claim 8, wherein when the value of γ is in a range of $0 < \gamma \leq 90^\circ$, said motor is driven as an open loop stepping motor, or wherein when $\gamma > 90^\circ$, said motor is driven as a closed loop brushless motor.